



The National Mall Rocks!

As you visit the monuments and memorials in Washington, DC you may be impressed by the large and beautiful structures designed to honor our Presidents and war veterans. These stone memorials help to tell the stories of America’s past. But have you ever wondered about the stories of the stones themselves? Take a closer look at the rocks that make up the memorials and you will discover how geology and history interlock on the National Mall.

The Three Types of Rocks Geologists classify rocks into three types: igneous, sedimentary, and metamorphic. Learn how to identify each type of rock, and then see if you can find all three types of rock during your visit on the National Mall.

Igneous



When molten magma cools, the minerals crystallize to form different kinds of igneous rocks. The magma can cool quickly or slowly, inside or outside of the earth’s crust. The slower it cools, the bigger the crystals can get. The mineral crystals in most granite are big enough to identify with your naked eye. If the magma cools very quickly, individual

minerals do not have time to develop large enough to identify without high power microscopes. An example of quickly cooled igneous rock is volcanic glass, or obsidian. Igneous rock, especially granite, makes great building material because of its strong, interlocking minerals.

Sedimentary



Over time, bits and pieces of sediment held together with different forms of natural cement can become sedimentary rock. The sediment can be small like sand, or big like boulders, while the cement can be very strong, or incredibly weak. Sandstone, mud-stone, and limestone are all examples of sedimentary rock. Look for preserved mud cracks, ripple marks, or fossils.

Interesting Note:
The formation of concrete is very similar to the formation of sedimentary rock. All you need for either one is some sand or gravel and “glue.” In many cases, the “glue” in concrete is a form of calcium -the same mineral found in limestone. You could even call concrete “Sedimentary Urbanite.”

Metamorphic



To metamorphose means to change from one thing to another. Rock that undergoes some sort of change, usually from an increase in heat and/or pressure, is called metamorphic rock. The minerals in the original rock actually recrystallize to become something new. Because the rock has been recrystallized, it is usually very strong.

Often, the new rock looks nothing like the old one. With increased heat and pressure, limestone metamorphoses into marble, shale into slate, and granite into gneiss. Marble is the building material of choice for many memorials and statues because of its strength and beauty.

The stone not only provides the building blocks of each structure, but strengthens the themes and ideas of the monuments and memorials as well.

Rock types for each memorial were chosen for their unique color, texture, and strength – as well as the mood they create. How do history and geology interlock on the National Mall? Take the following Geology Tour to discover some of the stories within the stones. You may want to start your tour at the Smithsonian Museum of Natural History to learn more about geology, minerals, and fossils.

The Lincoln Memorial



The Lincoln Memorial is a good location to test your skill as a geologist. All three types of rock are here. Granite from Massachusetts makes up the base of the memorial and the lower steps. Marble from Colorado was used for the exterior walls and columns. You will find pink Tennessee marble for the chamber floor, and thin slices of Alabama marble for skylights in the ceiling. The statue of Lincoln is carved out of white Georgia marble, surrounded by interior walls and columns of Indiana Limestone. The limestone has fossils of ancient sea creatures preserved inside it. Can you find anything in the limestone that look like little “O”s, or small fragments of a screen, or shells? (Check the wall and column closest to the bookstore.)

You are looking at fossils of crinoids, bryozoans, and brachiopods that lived over 300 million years ago in a shallow sea that once covered southern Indiana. The calcium in their bodies provides the natural cement that makes limestone a strong stone for construction.

Freedom and unity are two ideas that Lincoln embraced during his presidency. These ideas are embodied by the Lincoln Memorial, not only in the art and architecture, but also in the building materials. How do stones from quarries around the country contribute to the meaning of the memorial built to honor Abraham Lincoln? What story does the inscription on the top of the granite steps tell about freedom?

The Korean War and Vietnam Veterans Memorials



The mood at either war memorial is quite different from the moods at the presidential memorials. The stones, black granite from India (for the Vietnam Veterans Memorial) and California (at the Korean War Veterans Memorial), were chosen to provide places of both symbolic and actual reflection. Because the dark igneous rocks cooled quickly, individual minerals are not visible. The polished, mirror-like surfaces are where engraved names and pictures of veterans mingle with the reflections of each and every visitor to these memorials.

At the Korean War Veterans Memorial, the granite wall also reflects the 19 statues in the Field of Service for a total of 38 soldiers. This number represents the 38th Parallel between North and South Korea.

Why is reflection so important at these locations? Can you imagine how the feeling and mood of the war memorials would change if a different type of stone had been chosen?

The FDR Memorial



Unlike the grand, white marble structures of the Lincoln or Jefferson Memorials, FDR is remembered in an open-air memorial made of Carnelian granite from South Dakota. Granite is one of the earth’s most common types of stone, and FDR was seen as the champion of the “Common Man.” Different minerals come together to form the strong granite building blocks for the memorial, just as the citizens of the United States came together through incredible hardships under President Roosevelt, regardless of their differences. The variety of colors and textures in each granite block show changes in the cooling speeds and chemistry of the magma that formed the granite. In most cases, interlocking crystals of clear quartz, pink feldspar, and various dark minerals cooled slowly, and are large enough

to identify with your naked eye. You may even be able to see some Fool’s Gold, or Pyrite, in the granite. (Check the wall to the right of the eagle when entering the first term room.) Pyrite is deposited in hydrothermal, or “hot fluid” environments. Natural hot springs are found in places like Warm Springs, Georgia where ground water, heated by hydrothermal activity, returns to the earth’s surface.

More than just a memorial to FDR, this is a memorial to the idea of overcoming obstacles. What connection do hot springs have to FDR’s quest to overcome his personal obstacle of polio? How do the blocks of granite in the third term room represent the obstacles of World War II?

The Washington Monument



When looking at the Washington Monument, can you see where the marble changes color? The monument began construction in 1848 with white marble quarried near Baltimore, Maryland on the outside and gneiss (metamorphosed granite) from Little Falls, Maryland on the inside. Construction was completed in 1884 with marble again from Maryland for the exterior and granite from Maine for the interior. For almost 25 years, construction stopped because the project ran out of money. When construction began again, the original quarry could no longer supply an exact color match. The exterior geology of the Washington Monument makes the history of its construction visible. However, the most interesting geology is on the inside.

The Washington Monument stands not only because of the structural support of its construction stones, but also because of the symbolic support of its commemorative stones. During -and even after- the construction of the monument, 193 commemorative stones were donated by individuals, groups, cities, foreign countries, and all 50 states. Some of the more unique stones are from Alaska (green jade), Michigan (copper), Arizona (petrified wood), Minnesota (pipestone), and California (granite with real gold leaf lettering). Visit our website to see all 193 commemorative stones! www.nps.gov/wamo.

If you had to choose a type of stone to donate, what would it be and what story would it tell?